



Planning Considerations for Over Snow Movement





Terminal Learning Objective



Action: Plan for over snow movement

Condition: You are a small unit leader, given the requirement to move your unit over snow covered terrain.

Standard: Plan a 5 km over snow movement for a squad sized element with a solution plus or minus one hour.



Aviation





Wheeled



NORTHERN WARFARE TRAINING CENTER • "Battle Cold and Conquer Mountains"



Wheeled cont'



Road network usually small.

Considerable effort will be applied to keeping MSR's open.

**Trails become key terrain.
Recovery assets become critical.
Practice self recovery**





Snowmobile



Fast and maneuverable
Can tow an Ahkio or three skiers
Noisy and operator is exposed to wind



M973 Small Unit Support Vehicle





M973 Small Unit Support Vehicle



Variants include cargo, command, ambulance and troop carrier.

Can be slingloaded and airdropped.

Newest version is armored.

180 mile range on full fuel tanks



Individual Movement Techniques



Skiing

Snowshoeing

Skijoring

**Your flotation is every bit as important as your weapon
and clothing**



Skiing



Long distances must be traveled

Stealth is necessary

Conditions allow

SOLDIERS MUST BE PROFICIENT





Skiing cont.

- **Military skiing: is generally done on flat or rolling terrain that requires the use of cross-country (Nordic) skills.**
- **may require skiing down steep slopes using downhill (Alpine) skills.**
- **presents a major training challenge because of the time it takes to train Soldiers to be proficient on skis. Approximately 40 hrs.**
- **is an excellent alternative means of conducting physical training in winter**



Snowshoes

Easy to learn

More tiring

Not as quiet





Snowshoeing



YOU WILL LEAVE THE HARDPACK AT SOME POINT



Skijoring



- Can move a lot of Soldiers quickly using minimal vehicles
- Soldiers must be proficient on skis
- Load rucksacks and crew served weapons into SUSV.
- Risk assessment – cover all skin, mandatory eye protection and lookout with immediate contact with driver.



Route Planning Considerations





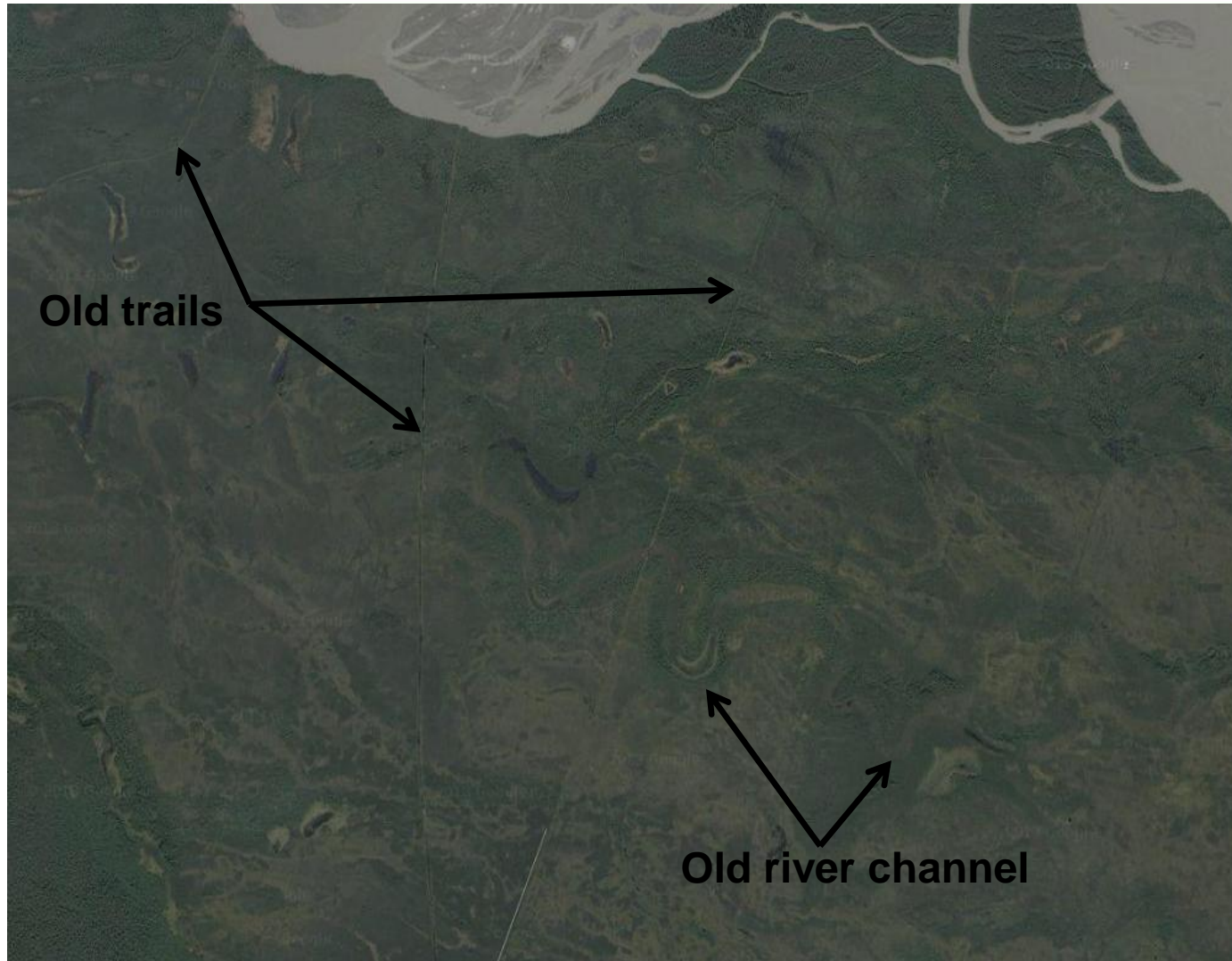
Route Planning Considerations

In addition to the tactical situation consider:

- **Use a map and available imagery**
- **Are oversnow vehicles available**
- **Soldier load-plan for the most heavily laden unit**
- **Limited visibility**
- **Track concealment**



Using Imagery



Old river channels may not be on maps.

Dark green areas are mature forest.

Light green/tan is lower brush.

Old trails may not be on maps.



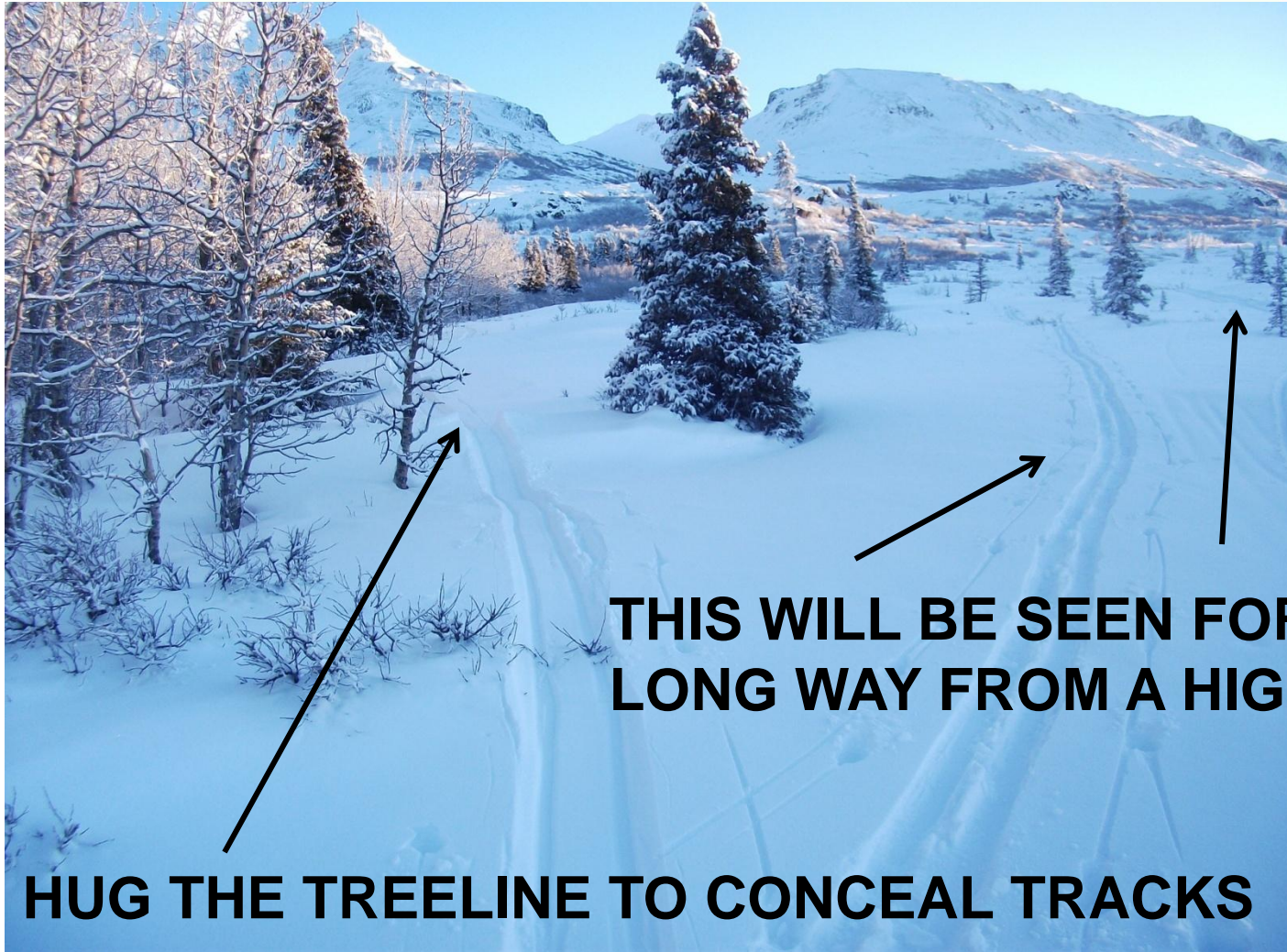
Route Planning Considerations: Open Terrain



- Follow the edges of tree lines to hide tracks
- Use the south side as the shadows are longer there
- Trail discipline must be enforced
- Navigation can get difficult on treeless tundra



Route Planning Considerations: Open Terrain



**THIS WILL BE SEEN FOR A
LONG WAY FROM A HIGHER OP**

HUG THE TREELINE TO CONCEAL TRACKS



Route Planning Considerations: Hills / Mountains



- Use gentle traverse to ascend or descend
- Follow contours once elevation is gained
- Avalanche considerations





Route Planning Considerations: Water Routes



- Generally excellent for navigation and ease of movement
- Detailed reconnaissance and marking of route-check ice thickness
- Stay close to shore or bank to provide concealment of tracks. Also provides cover
- Trees in river corridors are generally mature forest with a dense understory of brush
- River channels tend to meander adding distance
- Overflow may be present



Route Planning Considerations: Water Route Hazards



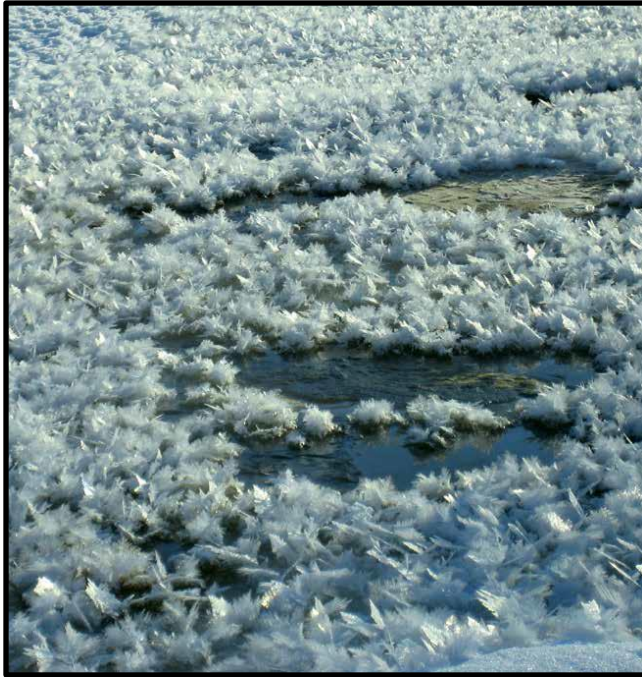
Steam rising indicates open water.

Look for frost on trees.





Route Planning Considerations: Water Route Hazards



“Frost flowers”



Frost flowers form as a result of water vapor condensing. Usually found on thin refrozen ice and in holes.



Route Planning Considerations: Water Route Hazards



Water level under the ice drops through the winter resulting in a space that cannot support weight.

Check for hollow sounds and the sound of flowing water.

Hole may refreeze just enough to support a layer of snow that conceals the weak spot. Avoid depressions.



Load Bearing Capacity of Waterborne Fresh Water Ice



Minimum Ice Thickness (Waterborne)			
Load	Minimum One Time Only	Normal Repeated Use	Distance Between Units
Soldier on skis	1.5 inches	2 inches	5 meters
Soldier on foot	3 inches	4 inches	5 meters
HMMWV	10 inches	13 inches	27 meters
SUSV	10 inches	13 inches	27 meters
UH-60/CH-47	15 inches	18 inches	80 meters

At 16INCHES, one additional inch will support 1 ton. Waterborne ice only.



Route Planning Considerations: Night Movement



- Breaks in contact and long halts can cause cold weather injuries
- Route must follow easiest possible terrain
- Route must be well marked



Methods of Trail Marking



Tripod



Beverage base powder



Sticks



Cairn



Tree blaze

**From one marker the next one should be seen.
Marks on the friendly side, close to the ground.**



Trail breaking on skis/snowshoes



- can take considerable effort; personnel must be rotated out frequently
- second Soldier does not step in leaders footprints; helps flatten trail
- third and fourth Soldiers help widen trail by offsetting left and right



Trail breaking with vehicles



Off set tracks to keep these ridges from forming.

You may have to knock down drifts by hand to keep MSR's open



Planning Rates of March





Movement Mode and Speed

Movement Mode	Unbroken Trail	Broken Trail
On foot- less than one foot of snow	1.5 to 3 kph	2 to 3 kph
On foot- more than one foot of snow	.5 to 1 kph	2 to 3 kph
Snow Shoeing	1.5 to 3 kph	3 to 4 kph
Skiing	1.5 to 5 kph	5 to 6 kph
Skijoring	N/A	8 to 24 kph

(Expected rates of march for troops carrying rucksacks over gently rolling terrain)



Effects of Terrain Angle on Speed

Uphill-

Add 1 hour for every 1000 foot increase in elevation

Downhill-

Add 1 hour for every 1600 foot decrease in elevation



March Table

Day ____ From Grid _____ Alt _____ To Grid _____ Alt _____									
Start Point	Degree Grid	Degree Mag	Terrain	Distance	End Leg Grid	Elevation	Change	Remarks	
Total Distance: _____ Total Elevation Change: _____									
Day ____ From Grid _____ Alt _____ To Grid _____ Alt _____									
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Practical Exercise

Your mission is to conduct a deliberate attack. The distance from your LD to assault position is 5 km.

Your route follows a unbroken trail crossing two ridge lines. The first is 550 feet above the surrounding terrain; the second is 450 feet.

There are 18 inches of snow on the ground. Your troops are proficient on snowshoes but not on skis.

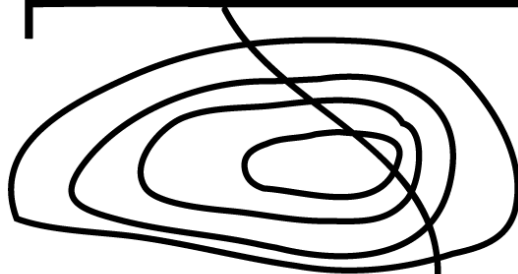


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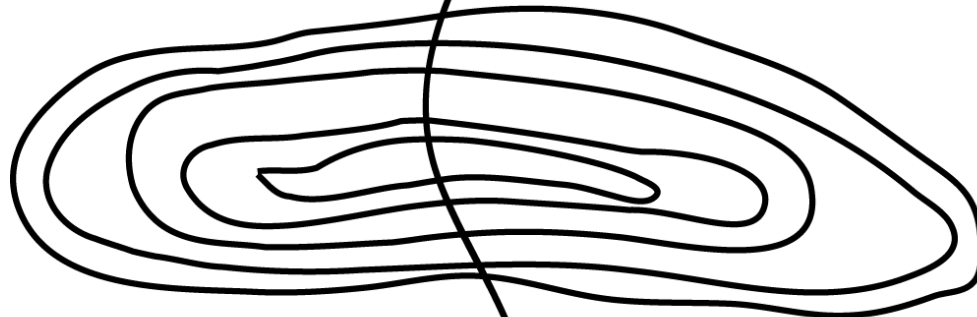
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Final Assault Position



**Ascend total of 1,000 feet: Add 1 hour
Descend total of 1,000 feet: Add 40 minutes
Total time for terrain factor: 1 hour 40 minutes**



***Line of Departure
Contour Interval 100 feet***



PE Solution

- 5K on 18 inches of new snow on snowshoes
3 hours and 20 minutes (1.5km/hr) +
 - "Terrain factor" - (effect of hills)
1 hour and 40 minutes
- = 5 hours



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